



History and Evolution of Automobiles

INTRODUCTION

You must have heard the word automobile. The meaning of automobile can be an auto car, motor car or car. It is a wheeled motor vehicle used for transporting goods or passengers, which also carries its own engine or motor. The word automobile comes from the ancient Greek word αὐτός (*autós*, meaning 'self') and the Latin word *mobilis* (movable), therefore automobile means a vehicle that moves itself. The alternative name, 'car' is believed to have originated from the Latin word *carrus* or *carrum* (wheeled vehicle), or the Middle English word *carre* (cart) (from Old North French). These words in turn are said to have originated from the Gaulish word *karros* (a Gallic chariot).

Most definitions of the term specify that automobiles are designed to run primarily on roads, have seating for one or more people, typically have four wheels and are constructed principally for the transport of people and goods.

In this Unit, you will understand the concept of a wheel and the role of a wheel cart. You will also learn the various stages of development over several hundred



years that made possible the invention of an automobile as we know it today.

SESSION 1: INVENTION OF WHEEL

The wheel is considered as one of the most important mechanical inventions of all times. The wheel has been used by man since the beginning of civilisation. Most primitive technologies since the invention of the wheel have been based on its principles.

The invention of the wheel perhaps happened in the late Neolithic age. It is likely that along with other technological advancements, it gave rise to the early Bronze Age.

4500 BC: Invention of the potter's wheel, Chalcolithic (Ubaid period)

4500–3300 BC: Chalcolithic, earliest wheeled vehicles, domestication of the horse

3300–2200 BC: Early Bronze Age

2200–1550 BC: Middle Bronze Age, invention of the spoked wheel and the chariot

Since the Industrial Revolution, the wheel has been a basic element of nearly every machine constructed by mankind. While the exact time and place of the invention of the wheel has been disputed, its beginnings can be seen across ancient civilisations.

History tells us that wheel was most likely invented in Mesopotamia (modern day Iraq) around 3500 BC. This means that the wheel (Fig.1.1) is about 5500 years old!

The first use of the wheel for transportation was in Mesopotamian chariots in 3200 BC. There are many references to wheeled chariots in Indian mythology also, dating to around 3000 BC. It is interesting to note that wheels may have been used in industrial or manufacturing applications before they were used on vehicles. Egyptians started using wheel with spokes, first in chariots around 2000 BC and use of wheels is believed to have started in Europe by 1400 BC.

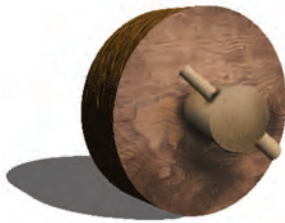
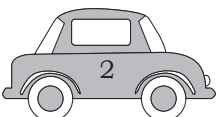


Fig.1.1: Wooden wheel



Wheel and Its Structure

It is hard to imagine any mechanised system that would be possible without a wheel or a idea of a symmetrical component moving in a circular motion about an axis. From tiny watch gears to automobiles, jet engines and computer disk drives, the principle is the same.

Early wheels were simple wooden disks with a hole for the axle. Due to the structure of wood, a horizontal slice of a tree trunk is not suitable, as it does not have the structural strength to support weight without collapsing; rounded pieces of longitudinal boards are required.

The oldest known example of a wooden wheel and its axle was found in 2003 in the Ljubljana Marshes some 20 km south of Ljubljana, the capital of Slovenia. According to the radiocarbon dating, it is between 5100 and 5350 years old. It has a diameter of 72 centimetres (28") and is made of ash wood, whereas its axle is made of oak.

The spoked wheel (Fig. 1.2) was invented much recently, and allowed the construction of lighter and swifter vehicles. Some noteworthy artefacts belonging to the Harappan civilisation of the Indus Valley and North Western India are toy-cart wheels made of clay with spokes painted or in relief, and the symbol of the spoked wheel in the script of the seals.

The earliest known examples of wooden spoked wheels are in the context of the Andronovo culture, dating to circa 2000 BC. Soon after this, horse cultures of the Caucasus region used horse-drawn spoked-wheel war chariots for the greater part of three centuries. They moved deep into the Greek Peninsula where they joined the existing Mediterranean people to give rise, eventually, to classical Greece after the breaking of Minoan dominance and consolidations led by pre-classical Sparta and Athens. Celtic-chariots introduced an iron rim around the wheel in the first millennium BC. The spoked wheel was in continued use without major modification until the 1870s, when wire wheels and pneumatic tires were invented.



Fig.1.2: Wheel with spokes

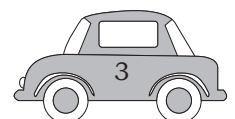




Fig. 1.3: Wheel — a circular component

The invention of the wheel has also been important for application in the water wheel, the cogwheel, the spinning wheel and the astrolabe or torquetum. More modern descendants of the wheel include the propeller, the jet engine, the flywheel (gyroscope) and the turbine. Therefore, we see that a wheel is a circular component (Fig.1.3) that can rotate on its centre. Wheels, in conjunction with axles, allow moving heavy objects with ease. The wheel is the main component of the wheel and axle assembly. Wheel and axle were used in the first carriages. We shall learn about these later.

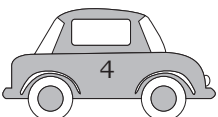
A wheel greatly reduces friction by facilitating motion by rolling together with the use of axles. In order for wheels to rotate, a push is needed to rotate the wheel about its axis.

The wheel is a device that enables efficient movement of an object across a surface where there is a force pressing the object to the surface. Common examples are a cart pulled by a horse and the rollers on an aircraft flap mechanism.

The low resistance to motion (compared to dragging) is explained as follows.

- The normal force at the sliding interface is the same.
- The sliding distance is reduced for a given distance of travel.
- The coefficient of friction at the interface is usually lower.

The classic spoked wheel with hub and iron rim was in use from about 500 ACE (Iron Age Europe) until the twentieth century AD. We can see the importance of wheel in various places and its role in our day-to-day life. Our national flag also has a circle signifying a wheel with spokes.



Practical Exercises

NOTES

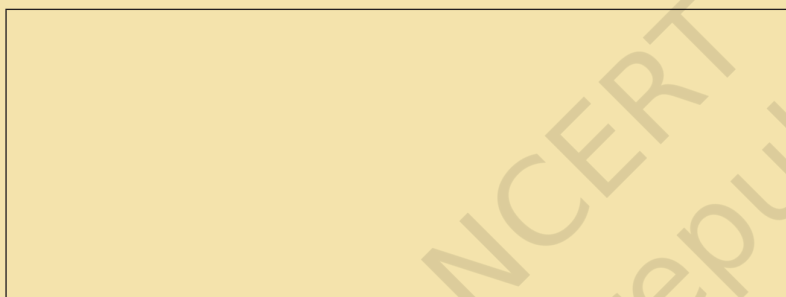
Activity 1

List the items where wheel is used as a part of machinery.

S.No.	Items	No. of wheels

Activity 2

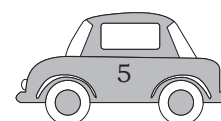
Identify any two types of wheels and draw their diagrams.



Check Your Progress

A. Fill in the blanks

- _____ is considered as one of the most important mechanical inventions of all times.
- Wheel was invented in _____ in around 3500 BC that is _____ years ago.
- A wheel is a _____ component that can rotate on its centre.
- Wheel is a _____ that enables efficient movement of an _____ across a surface where there is a force pressing it to the surface.
- The coefficient of friction at the interface of wheel is usually _____.



B. Multiple choice questions

1. How many years ago was the wheel invented?
 - (a) 2500 years
 - (b) 3500 years
 - (c) 5000 years
 - (d) 6000 years
2. Spoked wheel is used for which category of vehicle?
 - (a) Light
 - (b) Medium
 - (c) Heavy
 - (d) None of the above
3. Axle of wheel is fitted in the wheel in the _____.
 - (a) top
 - (b) bottom
 - (c) centre
 - (d) side

C. Short answer questions

1. Define a wheel's structure.
2. List the different types of wheel used in transport with examples.

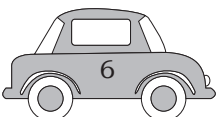
SESSION 2: WHEEL CART

Wheel cart is a vehicle designed for transport, using two wheels. A handcart is pulled or pushed by one or more people. However, history tells us that animals, instead of men, were used for pulling the carts, as they were more powerful. Normally, a cart was pulled by a pair of draught animals. The draught animals used for carts could be horses or ponies, mules, oxen, water buffalo or donkeys, or even smaller animals, such as goats or large dogs.



Fig.1.4: Chariot

Carts have been mentioned in literature as far back as the 2nd millennium BC. The Indian epic Mahabharata, which depicts Lord Krishna as the *saarathi* (the charioteer of the *rath*) and the chariot (Fig.1.4) carrying *Pandava* prince Arjuna in the battlefield of Kurukshetra, are some of the examples. In the Mahabharata war, all the leaders used a *rath* for fighting in the war.



Types of Cart

Carts have been in continuous use since the invention of the wheel in 3500 BC. Carts may be named after the animal that pulls them, such as horse-cart or ox-cart. In present times, horse-carts are used in competitions. A dog-cart, however, is usually a cart designed to carry hunting dogs. It is an open cart with two cross-seats back to back; the dogs can be penned between the rear-facing seat and the back end.



Fig. 1.5: Bullock-cart

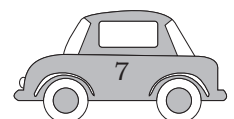
A bullock-cart or ox-cart (Fig.1.5) is a two-wheeled vehicle pulled by oxen (draught cattle). It is a means of transportation used since ancient times in many parts of the world. They are used even today in places where modern vehicles are too expensive or the infrastructure does not favour them.

Carts are used especially for carrying goods. Bullock-cart is pulled by one or two bullocks. The cart is attached to a bullock team by a special chain attached to yokes, but a rope may also be used for one or two animals. The driver and any other passenger can sit on the front of the cart, while the load is placed at the back.

Horse Power

How many men would be needed to equal the power of a horse?

After conducting some experiments, it was found that, on an average 10–12 men were needed to equal the power of one horse. This is the reason why mankind thought of using horses for pulling carts. This led to the development of a horse carriage.



Practical Exercises

Activity 1

List the different types of cart you have seen in your locality.

S.No.	Types of carts	No. of wheels
1		
2		
3		
4		
5		

Check Your Progress

A. Fill in the blanks

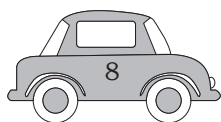
1. Carts are driven by_____.
2. In Mahabharata, the chariot was pulled by_____.
3. A bullock-cart or ox-cart is a _____ pulled by oxen(draught animal).
4. An average _____ men are needed to equal the power of one horse.

B. Short answer questions

1. How does a wheel cart help the farmer?
2. Why were wheel carts used during Mahabharata?
3. List the different types of carts.
4. Define horsepower.

SESSION 3: INVENTION OF AUTOMOBILES

Till now, we have learnt how the wheel was used in carts and about horse carriages for transportation of goods and people. Engineers kept improving the horse carriage design bit by bit. At the same time, people were working on a system that could be self-propelled,



meaning that the system could be run without any man or animal force required for moving it.

In the year 1672, the very first such model (Fig.1.6) was developed in the form of a toy. This was actually a steam engine, in which the power of steam was used to provide momentum to the toy.

Further improvements continued in various parts of the world. Then in the year 1806, the first car (Fig.1.7) powered by an internal combustion engine appeared. The fuel used for running this was 'fuel gas' instead of 'steam'. The process of using fuel gas is different from that of steam. Steam engine requires 'external combustion', whereas fuel gas uses the principle of 'internal combustion'. We shall study this in detail later.

Meanwhile, engineers continued to improve designs till the year 1885 when the first modern gasoline-or petrol-fueled engine was developed in Europe. It is important to note that inventions in science and technology cannot often be used immediately by general public. One reason is that the cost of developing new technology is very high. Also, the first models usually do not have any comfort features. However, when more people raise demand for the new models, the cost starts to come down. More features can also be added for making it attractive to general consumers.

Karl Benz, a German engineer designed and patented the first practical model (Fig.1.8) in 1885. This model used internal combustion engine and was called Motorwagen. Although several other German engineers (including Gottlieb Daimler, Wilhelm Maybach and

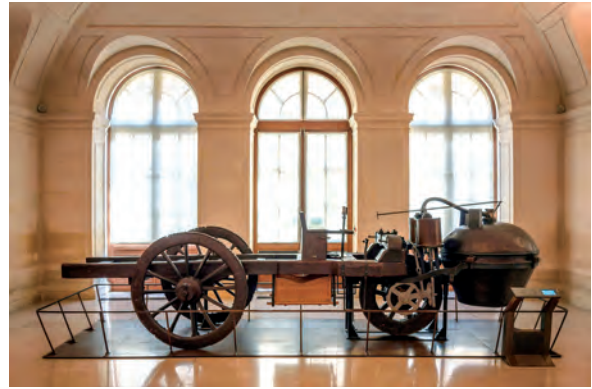


Fig.1.6: Cugnot Steam trolley



Fig.1.7: First practical car model



Fig. 1.8: Photograph of the original Benz Patent—Motorwagen, first built in 1885

Siegfried Marcus) were working on the problem at about the same time, Karl Benz generally is acknowledged as the inventor of the modern automobile.

Karl Benz built an automobile powered by his own four-stroke cycle gasoline engine in Mannheim, Germany

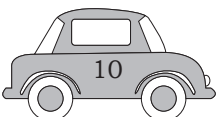


Fig. 1.9: Bertha Benz

in 1885 and was granted a patent in January of the following year, under the auspices of his major company, Benz & Cie., which was founded in 1883. It was an integral design, without the adaptation of other existing components and included several new technological elements to create a new concept. Benz began to sell his production vehicles in 1888.

In 1879, Benz was granted a patent for his first engine, designed in 1878. Many of his other inventions made the use of the internal combustion engine feasible for powering a vehicle. His first motor wagon was built in 1885, and he was awarded the patent for this invention, based on his application on 29 January 1886. Benz began promotion of the vehicle on 3 July 1886, and about 25 Benz vehicles were sold between 1888 and 1893, when his first four-wheeler was introduced along with a model intended for affordability. They were also powered with four-stroke engines of his own design. Emile Roger of France, already producing Benz engines under licence, also added the Benz automobile to his line of products. Since France was more open to the early automobiles, therefore, in the initial period more automobiles were built and sold in France through Roger, than Benz sold in Germany.

In August 1888, Bertha Benz, (Fig. 1.9) wife of Karl Benz, undertook the first roadtrip by car, to prove the road-worthiness of her husband's invention (Fig. 1.9). During the last years of the nineteenth century, Benz was the largest automobile company in the world with 572 units produced in 1899.



Towards the end of nineteenth century, many automobile companies came up in Europe and America. They started producing different models. But these automobiles were expensive and only a few rich people could afford them like kings, queens and *rajas* in India.

An average person could not afford to own a car. Many attempts were made in Europe and America for reducing the costs. The large-scale, production-line manufacturing of affordable automobiles was started by Ransom Olds at his Oldsmobile factory in 1902, based on the assembly line techniques pioneered by Marc Isambard Brunel at the Portsmouth Block Mills, England in 1802. The assembly line style of mass production and interchangeable parts had been pioneered in the U.S. by Thomas Blanchard in 1821, at the Springfield Armory in Springfield, Massachusetts. This concept was greatly expanded by Henry Ford, beginning in 1914. With the introduction of this new manufacturing process, Ford Motor company launched the first large-scale production of their Model T. (Fig. 1.10). In 1914, an assembly line worker could buy a Model T with four months' pay.



Fig. 1.10: Car Ford Model T



Fig. 1.11: 1926 Austin 7 Box

In Europe the same happened. Morris set up its production line at Cowley in 1924 and soon outsold Ford, while beginning in 1923 to follow Ford's practice of vertical integration. Morris bought Hotchkiss (engines), Wrigley (gearboxes), and Osberton (radiators). In 1925, Morris had 41 per cent of the total British car production. Most British small-car assemblers, from Abbey to Xtra, had failed. Citroën, a French automobile manufacturer, started building motor cars in 1919 and employing mass production techniques, within a year, was manufacturing 100 cars a year. Renault's 10CV and Peugeot's 5CV, produced 550,000 cars in 1925, and Mors, Hurtu and others could not compete. Germany's first mass-manufactured car,

the Opel 4PS Laubfrosch (Tree Frog), came off the line at Russelsheim in 1924, soon making Opel the top car builder in Germany, with 37.5 per cent of the market.



Fig.1.12: Mark V Tank

In 1926, Austin 7 Box was an economy car produced by Austin company (see Fig. 1.11).

Between the World Wars I and II, a lot of attention of the automobile industry went towards development of defence vehicles. As a result, several new vehicles like battletanks and jeeps were developed. The tank (Fig. 1.12) became very popular in the war field. It is a very versatile vehicle which can run in any road conditions, i.e., in cross-country terrain, hills, deserts, trenches, etc.



Fig.1.13: Jeweled one-millionth VW Beetle

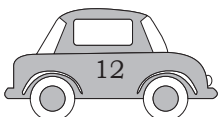
However, during this period, there were some very interesting designs in the passenger segment also. Volkswagen in Germany developed a car in 1930s, which looked like a crawling creature and was therefore called 'Beetle' (Fig. 1.13). This model had the engine at the back and the front bonnet was used as the luggage compartment. The car was very convenient to drive and looked stylish. It became popular in Europe.



Fig.1.14: Volkswagen type 1s model car

By 2002, over 21 million Volkswagen Type 1s (Fig. 1.14) had been produced, but by 2003, the annual production had dropped to 30,000 from a peak of 1.3 million in 1971. Volkswagen announced the end of production in June 2003. However, the opinion in the U.S. was not very good, perhaps because of the characteristic differences between the American and European

car markets. Henry Ford II, the grandson of Henry Ford, once described the car as 'a little box'.



Practical Exercises

Activity 1

Make a list of the automobile vehicles developed in the past.

S.No.	Type of vehicle	Model

Check Your Progress

A. Fill in the blanks

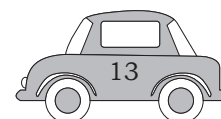
1. In the year _____ the very first model of a self-propelled system was developed in the form of a toy.
2. In year 1806, the first cars powered by _____ appeared.
3. _____, a German engineer, designed and patented the first practical model of an engine in 1885.
4. Volkswagen developed a car in the 1930s which looked like a crawling creature and was therefore called _____.

B. Multiple choice questions

1. In which year was the first vehicle invented?
(a) 1885 (b) 1650
(c) 1806 (d) None of the above
2. Who was the inventor of the first patented car?
(a) Karl Benz (b) Ratan Tata
(c) Mohandas Singh (d) None of the above
3. Which of these is Germany's first mass-manufactured car?
(a) Opel 4PS *Laubfrosch* (b) Volkswagen
(c) Ambassador (d) None of the above

C. Assignment

1. Make a list of the important manufacturers of cars in India.



SESSION 4: INVENTION OF AUTOMOBILES (POST WORLD WAR II)

Till now we have studied about the developments in the automotive sector before World War II.

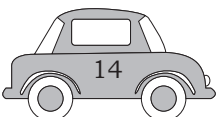
Post World War II, the automotive industry showed rapid modernisation in the 1950s and 1960s. Many new car models were introduced like Edsel, Chevrolet, etc.

In the U.S., road network was built after the World War II. This road network was quite modern with long highways stretching across the length and breadth of the country. It is noteworthy that U.S. has a large landmass and vast geography, which allows open and wide roads to be built. On these roads models like the Beetle do appear very tiny!

The Big Three of the car industry, namely General Motors, Ford and Chrysler set about to design big fast-moving cars for the American roads. Edsel, Buick, Pontiac Firebird, Chevrolet Impala, etc., were some of the big cars that came on American highways in the 1950s and 1960s. It may also be noted that these models used large amounts of petrol or gasoline as it is called in the U.S. But, petrol consumption was not a grave concern in those days. So, each car maker competed with the others in making bigger and better designs with more luxuries added for comfort. All this made owning and maintaining a car quite costly. However, more and more Americans bought these models. One very popular model from Ford was named 'Mustang'.

However, things changed after 1973. This was the year of the first 'Oil Crisis'. Petrol started becoming costlier as all the Arab nations got together in an alliance. Now, suddenly even Americans started looking for more economical designs.

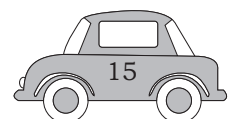
Meanwhile, quietly but with determination, Japan was developing cars for marketing worldwide, mainly in the U.S. Actually, after the devastation of their country during World War II, several Japanese companies came into existence like Toyota, Mazda, Mitsubishi, Suzuki, etc. Some of these like Mazda, were using American technology. But these companies were also developing their own research capabilities. As a result, when the



1973 oil crisis occurred, these companies were very well positioned to roll out smaller, compact, economical models in the U.S.

Since then, companies like Toyota, Honda have been steadily increasing their market presence worldwide. There are some technical and design aspects that differentiate modern cars from antiques. The modern era has been one of increasing standardisation, platform sharing and computer-aided design.

- (i) Toyota Corolla (1966–present)—a simple small Japanese saloon/sedan that has come to be the best-selling car of all time.
- (ii) Range Rover (1970–present)—the first take on the combination of luxury and four-wheeled drive utility, the original ‘SUV’. Such was the popularity of the original Range Rover Classic that a new model was not brought out until 1994.
- (iii) Mercedes-Benz S-Class (1973–present)—features like electronic anti-lock braking system, supplemental restraint airbags, seat belt pretensioners and electronic traction control systems made their debut in the S-Class. These features later became standard throughout the car industry.
- (iv) BMW 3 Series (1975–present)—the 3 Series has been on the Car and Driver magazine’s annual Ten Best list 17 times, making it the longest running entry in the list.
- (v) Honda Accord (1977–present)—this Japanese sedan became the most popular car in the U.S. in the 1990s, pushing the Ford Taurus aside, and setting the stage for today’s upscale Asian sedans.
- (vi) Dodge Aries and Plymouth Reliant (1981–89)—the ‘K-cars’ that saved Chrysler as a major manufacturer. These models were some of the first successful American front-wheel drive, fuel-efficient compact cars.
- (vii) Chrysler minivans (1983–present)—the two-box minivan design nearly pushed the station wagon out of the market, and presaged today’s crossover SUVs.



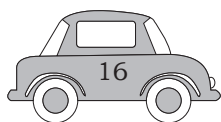
NOTES

- (viii) Renault Espace (1984–present)—first mass one-volume car of non-commercial MPV class.
- (ix) Ford Taurus (1986–present)—this mid-sized front-wheel drive sedan with modern computer-assisted design dominated the American market in the late 1980s, and created a design revolution in North America.
- (x) Pontiac Trans Sport (1989–99)—it was one of the first one-box cars.
- (xi) Toyota Prius (1997–present)—launched in the Japanese market, it reached a worldwide cumulative sales of 2 million units in September 2010, becoming the most iconic hybrid electric vehicle in the world.
- (xii) Ford Focus (1998–present)—one of the most popular hatchbacks across the globe, which is also one of Ford's best-selling world cars.
- (xiii) Tata Nano (2008–present)—it is an inexpensive (₹1,00,000), rear-engine, four-passenger city car built by an Indian company, Tata Motors, and is aimed primarily at the Indian domestic market.
- (xiv) Nissan Leaf and Chevrolet Volt (2010–present)—all these electric cars were launched in the American and Japanese markets in December 2010, thereby becoming the first mass production vehicles of their kind.

Indian Automobile Scenario

The automotive industry in India started with the import of cars for royal families, which perhaps started in 1920s.

For many years, India did not have any manufacturing capability of its own. Hindustan Motors is one of the initial car manufacturers in India, founded in 1942 by B.M. Birla. It was a leader in car sales until the 1980s, when the industry was opened up from protection. Hindustan Motors was the producer of the Ambassador car (Fig. 1.15), widely used as a taxicab and as a government limousine. This car was based on the Morris Oxford, a British car that dates back to 1954. The production of Ambassador stopped in 2014.



Another Indian company, Premier Automobiles was founded in 1944. The company first launched production of vehicles under licence from Dodge and Plymouth. In 1951, they began producing versions of Fiat 500 for the Indian market. This was followed by Fiat 1100 in 1954. In 1973, Premier renamed the Fiat 1100 as the 'Premier Padmini' (Fig. 1.16). Ambassador and Fiat/Padmini were the two dominant models of cars on the Indian roads till 1983.

In 1983, the Government of India started Maruti Udyog in collaboration with Suzuki of Japan. Maruti's first model called Maruti 800 (Fig. 1.17) became a huge success. Within 5–6 years the company reached an annual production of nearly 1,00,000 cars. They launched various models like 800, Gypsy, Omni van, Esteem, Zen, Baleno, etc.

By the end of 1990s, several other global multinational car makers also started manufacturing their models in India. Among them were General Motors, Ford, Hyundai, etc. In just a few years the Indian market for cars became a hotspot of global automotive activity.

As we see, the Indian auto industry started with the import of cars in the 1920s, followed by manufacturing in 1940s. With continued progress many Indian companies like Maruti, Tata, Mahindra have become big global names. They are not merely manufacturing European/American or Japanese designs, but are doing so with their own research and development capabilities. As a result of this, Nano model was developed by Tata Motors, which is the cheapest car in the world with all convenient and quality features. India also exports nearly 12 per cent of manufactured cars to Europe, U.S. and elsewhere in the world.



Fig. 1.15: Ambassador car



Fig. 1.16: Premier Padmini car



Fig. 1.17: Maruti 800 car

The automotive industry in India is one of the largest in the world and one of the fastest growing globally.

According to the Society of Indian Automobile Manufacturers, annual vehicle sales were projected to increase to 5 million by 2015 and more than 9 million by 2020. By 2050, the country is expected to top the world in car volumes with approximately 611 million vehicles on the nation's roads.

The majority of India's car manufacturing industry (Fig. 1.18) is based around three clusters in the south, west and north. The southern cluster near Chennai is the biggest with 40 per cent of the revenue share. The western hub near Pune is 33 per cent of the market. The northern cluster is primarily Haryana with 32 per cent. Chennai is also referred to as the 'Detroit of India' with the Indian operations of Ford, Hyundai, Renault and



Fig. 1.18: India's Car Manufacturing Industry

Nissan headquartered in the city and BMW having an assembly plant on the outskirts. Chennai accounts for 60 per cent of the country's automotive exports. Gurugram and Manesar in Haryana form the northern cluster where the country's largest car manufacturer Maruti Suzuki is based. The *Chakan* corridor near Pune, Maharashtra is the western cluster with companies like General Motors, Volkswagen, ŠKODA, Mahindra and Mahindra, Tata Motors, Mercedes Benz, Land Rover, Fiat and Force Motors having assembly plants in the area. Aurangabad with Audi, ŠKODA and Volkswagen also forms part of the western cluster. Another emerging cluster is in the state of Gujarat with manufacturing facility of General Motors in Halol and further planned for Tata Nano at Sanand. Ford, Maruti Suzuki and Peugeot-Citroen plants are also set to come up in Gujarat. Kolkata with Hindustan Motors, Noida with Honda and Bengaluru with Toyota are some of the other automotive manufacturing regions around the country.

Practical Exercises

Activity 1

List five models of cars of different companies.

S.No.	Name of model
1.	
2.	
3.	
4.	
5.	

Check Your Progress

A. Fill in the blanks

1. A very popular model from Ford was named _____.
2. The Big Three of the car industry, namely General Motors, Ford and Chrysler set out to design big fast, moving cars for the _____ roads.

3. The first cars imported in India were in _____.
4. _____ and _____ were the two dominant models of cars on the Indian roads till 1983.
5. In 1983, the Government of India started Maruti Udyog in collaboration with _____ of Japan.
6. The first Indian car which is cheapest in the world is _____.

B. Multiple choice questions

1. In which year was the first car imported in India?
 - (a) 1920
 - (b) 1942
 - (c) 1970
 - (d) None of the above
2. Which of these is the first car manufactured in India?
 - (a) Ambassador
 - (b) Fiat
 - (c) Nano
 - (d) Padmini
3. Which city is referred to as the “*Detroit of India*”?
 - (a) Pune
 - (b) Gurugram
 - (c) Chennai
 - (d) Delhi
4. In which year was the India company Premier Automobiles founded?
 - (a) 1940
 - (b) 1944
 - (c) 1960
 - (d) 1970

